

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re: Patent application of	:	
Randell L. Mills	:	
	:	Group Art Unit:
Serial No.: 08/467,911	:	3641
	:	
Filed: June 6, 1995	:	Examiner:
	:	H.E. Behrend
For: ENERGY/MATTER CONVERSION	:	
METHODS AND STRUCTURES	:	

SECOND DECLARATION OF RANDELL L. MILLS, M.D.,
UNDER 37 C.F.R. 1.132

I, Randell L. Mills, M.D., declare as follows:

1. I am the inventor of the invention described and claimed in the above-identified application.
2. I have read and understand the office action dated September 15, 1997.
3. Attached hereto as Exhibits 32 and 33 ("2nd Mills Ex. __") are documents describing further evidence confirming the results obtained and disclosed in the specification.
4. "Cold fusion" systems have never utilized gas cells or vapor phase cells operating at such low pressures. "Cold fusion" systems which utilize gas cells or vapor phase cells typically operate at pressures greater than 100 torr. The gas cells and vapor phase cell embodiments of the present invention operate at much lower pressures, typically, less than 1 torr.

Westinghouse analysis of ESCA data

5. Several ESCA spectra of a nickel cathode used in an electrolytic cell embodiment of the present invention were obtained by ESCA analysis. I forwarded one ESCA spectrum to Westinghouse STC for analysis. A peak in the ESCA spectrum was observed at 55 eV. I assigned the 55 eV peak to the hydrino atom $H(n = 1/2)$. The Westinghouse author asserted that the 55 eV may be attributed to iron, lithium or osmium. The results of the Westinghouse study are set forth in the Westinghouse STC Report (1st Mills Ex. 19). I did not provide Westinghouse with the additional ESCA spectra of the nickel cathode. The additional ESCA spectra covered varying binding energy ranges. The presence of iron, lithium or osmium would produce one or more peaks in the additional ESCA spectra at specific binding energies. No peaks at the binding energies for iron, lithium or osmium were observed in the additional ESCA spectra. Therefore, the additional ESCA spectra eliminate the possible assignment of the 55 eV peak to iron, lithium or osmium.

6. Charles Evans & Associates performed Time-of-Flight Secondary Ion Mass Spectrometry (TOF-SIMS) analysis on two samples of nickel wire removed from a nickel cathode used in generating hydrinos in an electrolytic cell of the present invention. See 1st Mills Dec. ¶ 79 and 1st Mills Ex. 16. No osmium was detected by the TOF-SIMS analysis of the two samples. See 1st Mills Ex. 16. Therefore, the 55 eV peak in the ESCA spectrum analyzed by Westinghouse is not attributable to osmium.

7. Hydrino atoms on the nickel cathode, which generated the ESCA spectrum provided to Westinghouse, can be observed by ESCA, notwithstanding the high vacuum of the ESCA machine. This is because the hydrino atoms are bonded to the nickel of the cathode. Just

as normal hydrogen atoms readily bond to nickel, the hydrino atoms bonded to the nickel. Since the hydrino atoms were bound to the nickel, they remained on the surface of the cathode despite the high vacuum of the ESCA machine.

Westinghouse Calorimetry Experiments

8. Three electrolytic cells according to the present invention, containing potassium carbonate electrolyte, were provided to Westinghouse STC by Hydrocatalysis Power Corp., which subsequently became Blacklight Power, Inc., assignee of the present application. Westinghouse performed calorimetry experiments on the three electrolytic cells. One of the electrolytic cells was also tested with sodium carbonate electrolyte as a control. The electrolytic cells containing potassium carbonate electrolyte produced 100% excess heat as compared to the control electrolytic cell containing sodium carbonate electrolyte. A report was prepared by Westinghouse STC (1st Mills Ex. 12).

9. The author of the Westinghouse STC report has questioned the results of the experiments. The Westinghouse author asserted that the temperature variation of the cells during the experiments affected the amount of heat loss due to evaporation of water. The evaporation of water in the electrolytic cells tested by Westinghouse would have decreased the amount of excess heat observed in the electrolytic cells containing potassium carbonate electrolyte. The electrolytic cells containing potassium carbonate electrolyte were operated at a higher temperature than the control electrolytic cell containing sodium carbonate electrolyte. See 1st Mills Ex. 12, pages 10-11. Since the electrolytic cells containing potassium carbonate electrolyte were operated at a higher temperature than the control electrolytic cell, the former

would be expected to lose more heat due to evaporation of water than the control electrolytic cell. The water evaporation would cause less excess heat to be observed in the electrolytic cell containing potassium carbonate electrolyte than actually produced. Therefore, the Westinghouse author's assertion that the excess heat observed from the electrolytic cell containing potassium carbonate electrolyte may be due to evaporation of water is misplaced.

XPS experiments at Lehigh University

10. Cathodes used for hydrino generation were removed from their electrolytic cells and subjected to XPS experiments at Lehigh University. A peak was observed at 55 eV on the XPS spectra of all the cathodes used for hydrino generation. The 55 eV peak was assigned to the hydrino atom $H(n = 1/2)$. All the cathodes analyzed at Lehigh University contained some contaminants. It is nearly impossible to obtain a cathode without any contaminants.

11. XPS was performed at Lehigh University on one cathode sample which was heated to over 700 °C. A peak at 55 eV was observed. The peak was assigned to the hydrino atom $H(n = 1/2)$. The hydrino atoms did not diffuse out of the cathode sample since they were bound to the nickel surface of the cathode. The bonded hydrino atoms do not dissociate from the nickel at 700 °C.

12. The position of the 55 eV peak varied over about 2 eV over all of the cathodes tested at Lehigh University. I believe that the variation of the peak is due to bonding interactions of the hydrino atom with the nickel. Just as normal hydrogen atoms bound to nickel

exhibit a broad binding energy range, hydrino atoms bound to nickel are also expected to exhibit a broad binding energy range as observed.

13. In a separate experiment at Lehigh University, XPS tests were performed on three pieces of unused nickel cathode material treated with hydrogen peroxide and potassium carbonate. See 1st Mills Ex. 19. A peak at about 57 eV was observed on two of the three pieces of nickel material. The 57 eV peak was not observed on the third piece of nickel material since the hydrogen peroxide did not dissociate or dissociated at a very slow rate. The discrepancy is explained as follows. The hydrogen peroxide is expected to dissociate to produce hydrogen atoms upon contact with the surface of the nickel material. The hydrogen atoms then react with the potassium carbonate to produce hydrino atoms. The rate at which the hydrogen peroxide dissociates is expected to vary significantly depending on the conditions of the nickel surface. Hydrogen peroxide may dissociate at a very slow rate due to poor contact with the nickel surface. I believe that this poor contact occurred with the third piece of nickel material. This is why the third piece failed to which exhibit a peak at about 57 eV.

Experiments performed by Dr. Jonathan Phillips

14. Jonathan Phillips, an Associate Professor of Chemical Engineering at Pennsylvania State University, tested the effect of flowing hydrogen gas in the presence of eight sample catalyst materials. In the §132 Declaration of Jonathan Phillips (1st Mills Ex. 7), Dr. Phillips states that in seven out of the eight samples, excess heat was observed, but the duration and strength of the heat varied. The eight samples were prepared by HydroCatalysis Power Corp. See 1st Mills Ex. 7. The eight samples were comprised of varying amounts of potassium

nitrate, platinum (or palladium), and graphitic carbon. The platinum (or palladium) and graphitic carbon dissociate the hydrogen molecules. The potassium nitrate reacts with free hydrogen atoms to produce hydrino atoms and excess heat. By varying the amounts of potassium nitrate, platinum (or palladium), and graphitic carbon, the amount of hydrino atoms and excess heat produced may be varied. The eight samples containing varying amounts of potassium nitrate, platinum (or palladium), and graphitic carbon are therefore expected to produce varying amounts of heat.

Declarations of Sergei Nesterov and Alexei Kryukov, Dr. Jonathan Phillips,
and Robert Shaubach and Nelson Gernert

15. The §132 Declaration of Sergei B. Nesterov and Alexei Kryukov in Exhibit 22 to the Declaration of Randell L. Mills was filed in the U.S. patent application of Randell L. Mills entitled "Energy/Matter Conversion Methods and Structures", Serial No. 07/825,845, which is a parent application to the present application. The photocopy of the §132 Declaration of Sergei B. Nesterov and Alexei Kryukov is a true and correct copy of the original.

16. The §132 Declaration of Jonathan Phillips in Exhibit 7 to the Declaration of Randell L. Mills was filed in the U.S. patent application of Randell L. Mills entitled "Energy/Matter Conversion Methods and Structures", Serial No. 08/467,051, an application related to the pending application. The photocopy of the §132 Declaration of Jonathan Phillips is a true and correct copy of the original.

17. From the experimental configurations described in the §132 Declarations of Jonathan Phillips, Sergei B. Nesterov and Alexei Kryukov, and Robert M. Shaubach and Nelson J. Gernert, one skilled in the art could construct and operate the device described therein.

Experiments performed at Ontario Hydro

18. Tests at Ontario Hydro were conducted pursuant to a three year secrecy agreement of July 5, 1990 between Ontario Hydro and me. See 2nd Mills Ex. 32. The secrecy agreement provided:

Recipient hereby agrees not to disclose DISCLOSURES and DATA to others (except to its employees who reasonably require same for purposes hereof and who are bound to it by like obligation as to confidentiality) without the express written permission of the INVENTOR.

I never gave Ontario Hydro permission to release any information concerning the tests.

19. Ontario Hydro constructed and operated two electrolytic cells of the present invention. In a fax dated June 6, 1991, Dr. Armando Antoniazzi of Ontario Hydro reported calorimetry results from the electrolysis of a 125 ml light water solution of 0.57 M K_2CO_3 . Dr. Antoniazzi also reported the results from the electrolysis of a 125 ml heavy water solution of 0.57 M K_2CO_3 . I predicted that less heat would be observed with the heavy water cell because of the slower catalysis rate due to the kinetic isotope effect. See 2nd Mills Ex. 33. In both cells, the cathode was a 69.7 cm² nickel foil and the anode was a platinum mesh. The voltage applied across the electrodes was 2.25 V at a current of 0.08 A. After accounting for the enthalpy of formation of water, the electrolysis power was 62 mW. The calibration constant of the cell was determined "on the fly", i.e., power was added in addition to the electrolysis power, and the incremental increase in temperature of the cell for an incremental increase in input power was determined. The calibration constant in both cases was 15.6 °C/Watt. At 2.7 watts total power, which is the sum of the heating power and the electrolysis power, the temperature increase of the light water cell was 45.5 °C, whereas, the temperature increase of

the identical heavy water cell was 36.0 °C. Thus, the light water cell produced 0.61 W of excess power which was ten times the electrolytic input power of 62 mW.

20. In addition, I personally performed calorimetry experiments at Ontario Hydro from January 9, 1991 to January 11, 1991 as a demonstration to Ontario Hydro staff including Dr. Armando Antoniazzi who assisted with the measurements. Four electrolysis experiments were performed each using a 100 ml light water solution of 0.57 M K_2CO_3 in a 500 ml silvered vacuum jacketed dewar with a 7.5 cm X 5 cm X 0.125 mm thick nickel foil spiral cathode and a 10 cm X 1 mm diameter platinum spiral wire anode. A voltage of about 2.20 V at a constant current of 83 mA was applied across the electrodes in the first three experiments. In the fourth experiment, pulsed electrolysis was performed with a peak voltage of 2.19 V, an offset voltage of 2.00 V, a peak current of 115 mA, and a 35% duty cycle at 500 Hz. The cells were calibrated "on the fly". The cell calibration constants ranged from 15.0 °C/Watt to 17.3 °C/Watt. The cell calibration constant for one of the experiments was confirmed by applying resistive heating to the cell, without electrolysis, with mixing provided by a stirrer. The excess power generated by the pulsed cell was 45 times the electrolysis power. The excess power for the direct current electrolysis cells was 7.5, 13, and 8.7 times the electrolysis power.

I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements are made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that willful false statements may jeopardize the validity of the application or any patent issuing thereon.

3/13/98

Date

Randell L. Mills, M.D.

RANDELL L. MILLS, M.D.

CONFIDENTIAL DISCLOSURE AGREEMENT

THIS AGREEMENT, effective as of the later of the signature dates below, and between Ontario Hydro, having an address at 700 University Avenue, Toronto, Ontario, Canada M5G 1X5, hereinafter referred to as "RECIPIENT", and Dr. Randell L. Mills, Box 142, Cochranville, PA 19330, USA, hereinafter referred to as "INVENTOR", shall govern the conditions of disclosure by the INVENTOR or RECIPIENT of certain confidential information relating to "Energy/Matter Conversion Methods and Structures" and information complimentary to the United States Patent application Serial numbers 341733 filed 21, April 1989 and 345628 filed 28, April 1989, both filed by the INVENTOR as well as the documents "A New Atomic Theory" and "Unification of Energy and Matter". A written copy of any oral discussion, laboratory data, protocols and experimental demonstrations that constitute confidential disclosure will be provided by the INVENTOR within 30 business days. Further confidential disclosure is U. S. Patent Application Number 368246 entitled Apparatus and Method for Providing an Antigravitational Force, and the book entitled "The Grand Unified Theory."

With regard to DISCLOSURES and DATA, RECIPIENT hereby agrees:

1. Except as provided in (3) below, not to use such information for any commercial purpose, but instead to use such information only for purposes of evaluating its interest in the said DISCLOSURES and DATA: and
2. Except as provided in (3) below, not to disclose DISCLOSURES and DATA to others (except to its employees who reasonably require same for the purposes hereof and who are bound to it by like obligation as to confidentiality) without the express written permission of the INVENTOR.
3. RECIPIENT shall not be prevented from using or disclosing information:
 - (a) which RECIPIENT can demonstrate by written records was previously known to it.
 - (b) which is now, or becomes in the future, public knowledge other than through acts of omissions of RECIPIENT; or
 - (c) which is lawfully obtained by RECIPIENT from sources independent of INVENTOR.

It is further agreed that the furnishing of DISCLOSURES and DATA to RECIPIENT shall not constitute any grant or license to RECIPIENT under any patent rights now or hereinafter held by INVENTOR or otherwise. The obligations of RECIPIENT under the terms of this Agreement shall remain in effect for three (3) years from the date hereof.

RECIPIENT

By: [Signature]

Name: D. P. DAUTOVICH

Title: PROGRAM MANAGER

Date: July 5/90

INVENTOR

By: [Signature]

Name: Randell L. Mills M.D.

Title: President Mills Technology, Inc.

Date: 7/5/90

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MESSAGE

Dear Randy,

Here are graphs of my results. I will
clarify during ~~the~~ our telephone conversation
some of the particulars. The information
is not to be published or copied without
my approval.

Thanks,

Armando

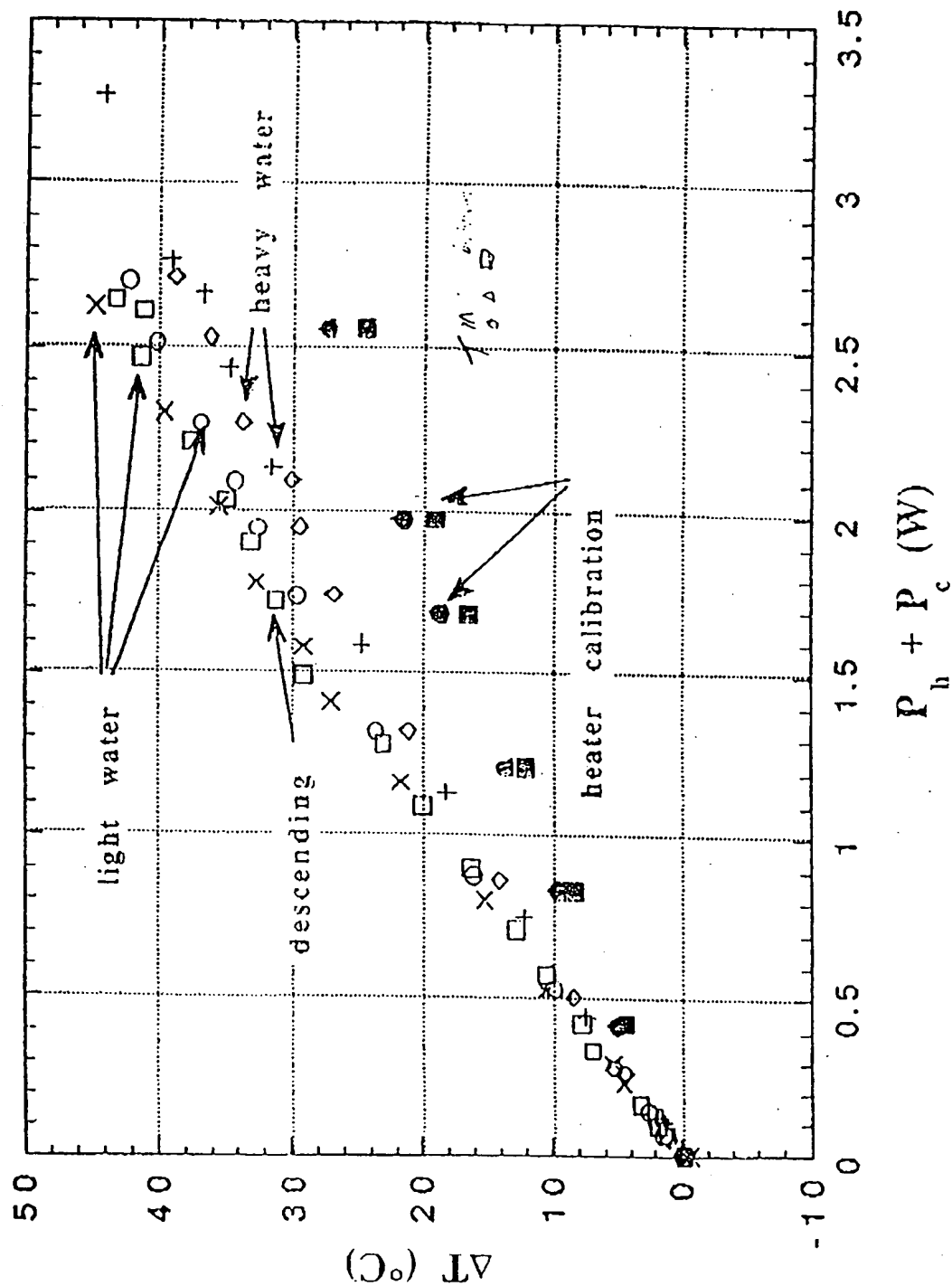
FM: Dr. Armando Antoniazzi

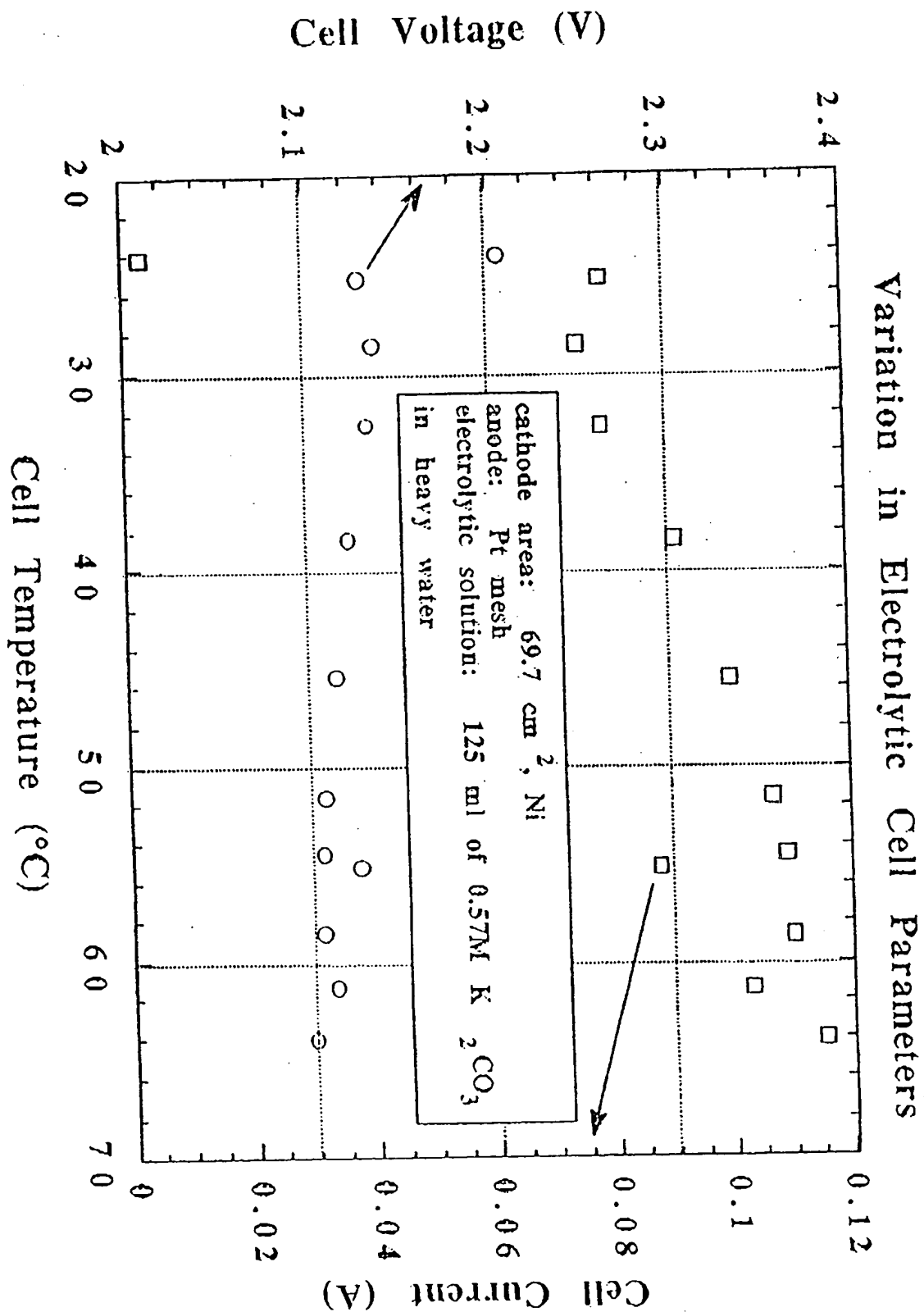
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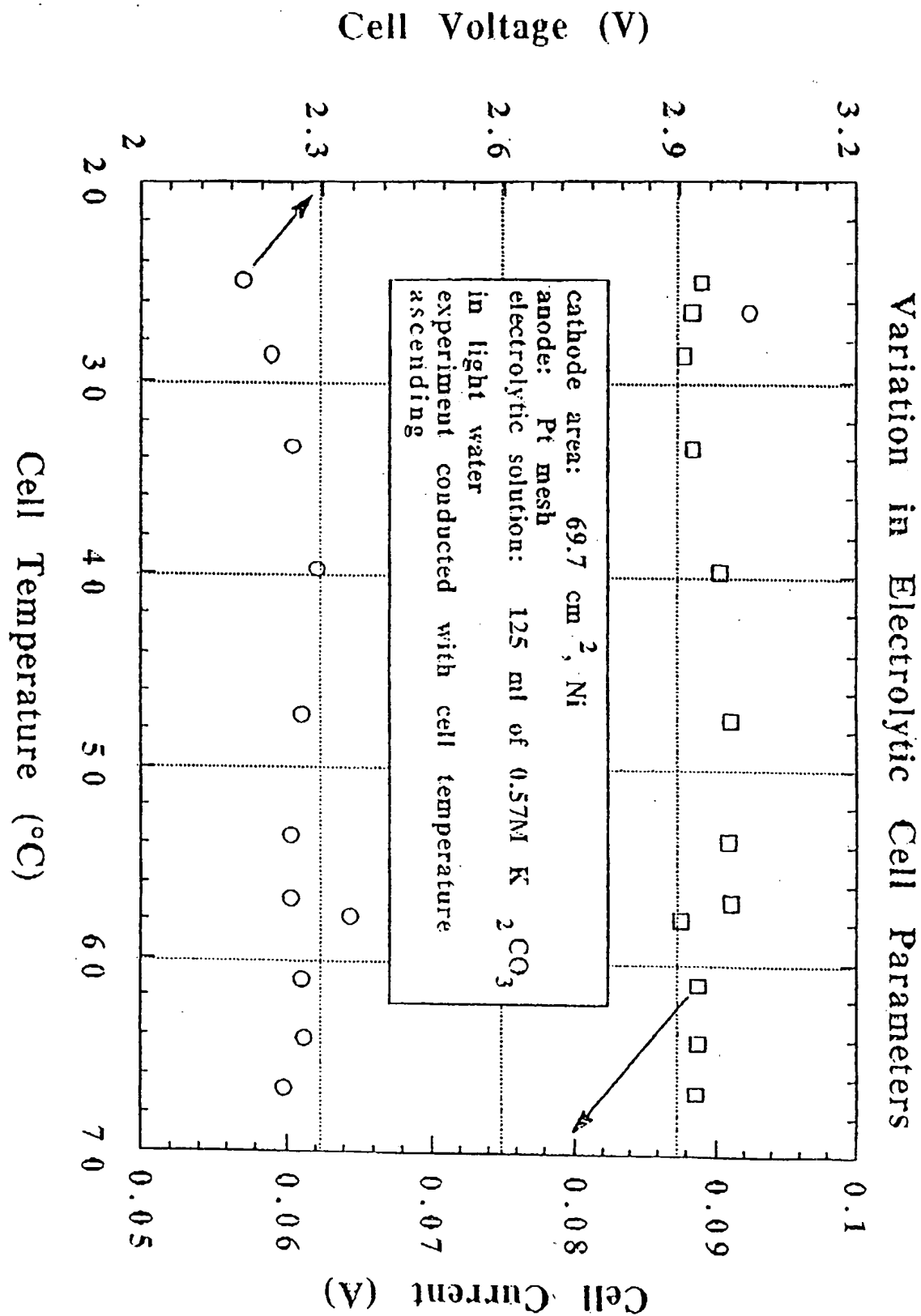
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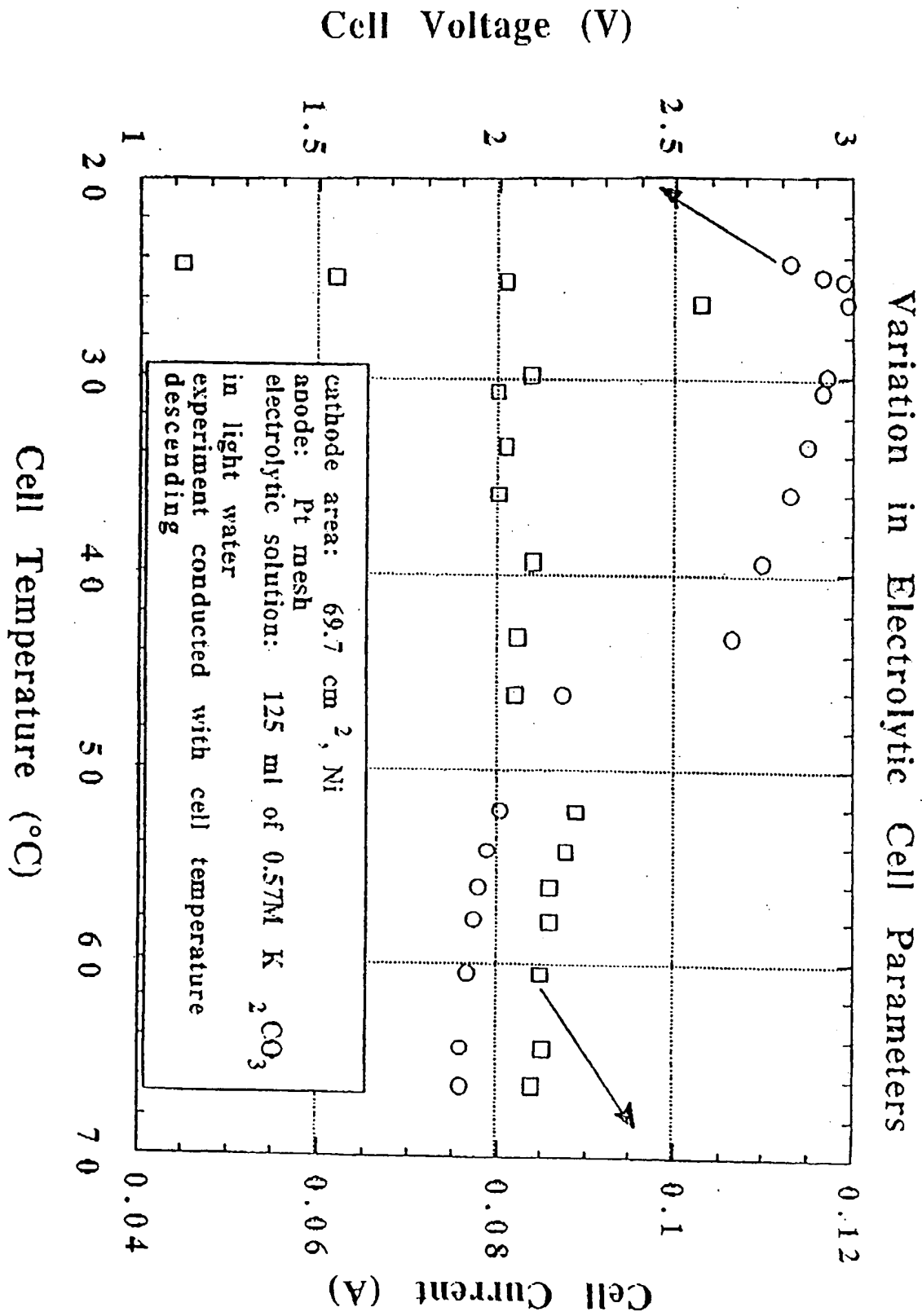
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Observed Temperature Changes with Input Power









Variation in Electrolytic Cell Parameters

